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have depended upon the unaided eye to detect reaction, and the work was done without the use of a clinostat. Methods of such crudeness must give questionable data. He states that BACH's results are not suited to test VAN'T HOFF's law, but so far as they give data they indicate a coefficient of 3.75. In contrast to this statement it should be mentioned that BACH determined the presentation time in the epicotyl of *Vicia Faba* for every two-degree change from 14° to 34°. This was done by accurate methods, and one must conclude that Bach's figures are good for testing the application of the VAN'T HOFF law between 14° and 34°. The following are the coefficients figured from BACH's table: 14°-24°, 3.88; 16°-26°, 4.61; 18°-28°, 4.54; 20°-30°, 3.80; 22°-32°, 2.00; 24°-34°, 1.59. As is seen here, the coefficient is rather variable.—WILLIAM CROCKER.

**Anatomy of Welwitschia.**—Miss SYKES<sup>14</sup> has investigated a large number of seedlings and young plants of *Welwitschia*, placed at her disposal by Professor PEARSON. The mature plant is aptly spoken of as an "adult seedling," since the main axis consists of root and much enlarged hypocotyl. Two ridges are developed by rapidly dividing parenchyma, the inner one bearing the strobiliferous axes. Each cotyledon is supplied by a pair of collateral bundles, which unite to form one pole of the diarch root, the transition being remarkably slow, probably on account of the great length of the hypocotyl. The four cotyledonary bundles are joined by the bundles from the buds, ridges, and leaves, this association of bundles forming four concentric groups, so that there is at no time any real stem structure. In the character of four cotyledonary bundles connected with a diarch root, *Welwitschia* is associated with *Araucaria* and *Podocarpus*, and also in the details of the transition. The small amount of primary vascular tissue is a remarkable feature, being limited to the root poles, the four cotyledonary bundles, and the four connecting hypocotyledonary bundles. In the base of the cotyledon, centripetal xylem is developed in connection with the two bundles, and of course the bundles traversing the hypocotyl become exarch.

The retention of the seedling characters in the adult plant makes a comparison impossible with the stem structure of other groups; and if the vascular structure of seedlings depends to a large extent upon "habitat and environment," as the author considers probable, a seedling comparison cannot be significant in indicating relationships. The result of the study, therefore, has been to uncover some interesting facts in reference to the anatomy of *Welwitschia*, rather than to uncover some much needed suggestion as to relationship.—J. M. C.

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<sup>14</sup> SYKES, M. G., The anatomy of *Welwitschia mirabilis* in the seedling and adult states. Trans. Linn. Soc. London II. Bot. 7:327-354. pls. 34, 35. figs. 5. 1910.